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| 10/716,748      | 11/19/2003  | Ronald G. Polcawich  | ARL 03-09           | 7460             |

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FORT BELVOIR, VA 22060-5527

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| EXAMINER |
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NGUYEN, SANG H

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2886

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS                               | 03/22/2007 | PAPER         |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                 |                  |  |
|------------------------------|-----------------|------------------|--|
| <b>Office Action Summary</b> | Application No. | Applicant(s)     |  |
|                              | 10/716,748      | POLCAWICH ET AL. |  |
|                              | Examiner        | Art Unit         |  |
|                              | Sang Nguyen     | 2886             |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 12/29/07.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 23-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-39 is/are rejected.
- 7) ☒ Claim(s) 40-42 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

Applicant's response to amendment filed on 12/29/06 has been entered. It is noted that the application contains claims 23-42 and claims 1-22 have been canceled by the amendment filed on 12/29/06.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

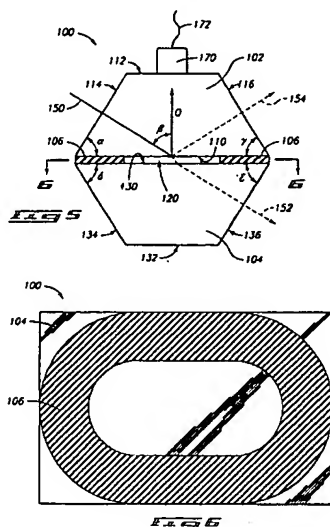
**Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by Autrey et al (U.S. Patent No. 6,348,968).**

**Regarding claim 26;** Autrey et al discloses an integrated photoacoustic spectroscopy cell, comprising:

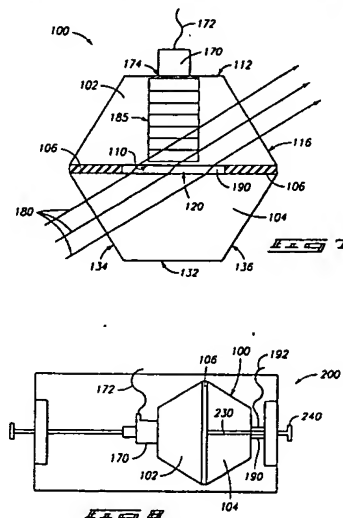
photoacoustic spectroscopy cell (100 of figure 5) having a multi-layer structure (102, 106, 104 of figure 5) for receiving a gas sample (col.6 lines 21-26) for the spectroscopy cell (100 of figure 5) and having an inner layer (106 of figure 5 is shim material) disposed between top and bottom outer layers (i.e., first block material [102 of figure 5] and second block material [104 of figure 5]), with the inner layer (106 of figure 5) being patterned to form a resonance cavity (center sample reservoir [120 of figure 5]); and

a thin-film membrane microphone (i.e., a transducer is preferably an acoustic microphone [col.2 line 50 to col.3 line 12 and col.8 line 66 to col.9 line 5]) formed on one of the outer layers (102 of figure 7) and acoustically coupled to the resonant cavity (120 of figure 7). See figures 1-13.

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### Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 27-28 and 31-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Autrey et al (U.S. Patent No. 6,348,968) in view of Oberhardt (U.S. Patent No. 5,110,727).**

**Regarding claims 27-28 and 33;** Autrey et al discloses method and an integrated photoacoustic spectroscopy cell, comprising:

photoacoustic spectroscopy cell (100 of figure 5) having a multi-layer structure (102, 106, 104 of figure 5) for receiving a gas sample (col.6 lines 21-26) for the spectroscopy cell (100 of figure 5) and having an inner layer (106 of figure 5 is shim material) disposed between top and bottom outer layers (i.e., first block material [102 of figure 5] and second block material [104 of figure 5]), with the inner layer (106 of figure 5) being patterned to form a resonance cavity (center sample reservoir [120 of figure 5]); and

a thin-film membrane microphone (i.e., a transducer is preferably an acoustic microphone [col.2 line 50 to col.3 line 12 and col.8 line 66 to col.9 line 5]) formed on one of the outer layers (102 of figure 7) and acoustically coupled to the resonant cavity (120 of figure 7). See figures 1-13.

Autrey et al discloses all of features of claimed invention except for at least the inner is patterned to include buffer cavities on either side of the resonant cavity.

However, Oberhardt teaches that it is known in the art to provide buffer cavities (22, 26,

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24 of figure 14) of the inner layer (20 of figure 16) on either side thereof of the top and bottom layer (10, 30 of figure 16) and one or both of the top and bottom outer layers (10, 30 of figure 16) being patterned to include a portion of the buffer cavities (14, 12 of figure 13) of the top layer (10 of figure 13) on either side of the resonant cavity (22, 26, 24 of figure 14). See figures 13-17 and 19.

U.S. Patent May 5, 1992 Sheet 13 of 31 5,110,727

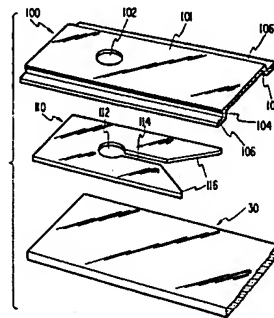


FIG. 19

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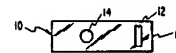


FIG. 13

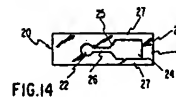


FIG. 14

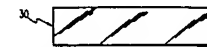


FIG. 15

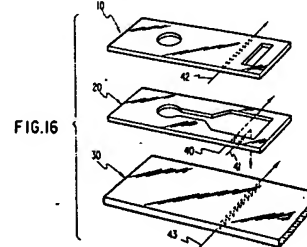


FIG. 16

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with buffer cavities on either side thereof and one or both of the top and bottom outer layers being patterned to include a portion of the buffer cavities on either side of the resonant cavity as taught by Oberhardt for the purpose of performing accurately and reproducible coagulation assay of sample with minimum sample manipulation.

**Regarding claim 32;** Autrey et al discloses all of features of claimed invention except for the layers are silicon wafers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with the layers are made of silicon wafers, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Regarding claim 31;** Autrey et al discloses the microphone (170 of figure 7) is acoustically coupled to the resonant cavity (120 of figure 7) through an acoustic port (185 of figure 7) in communication with the resonant cavity (120 of figure 7).

**Regarding claims 34-38;** Autrey et al discloses all of features of claimed invention except for the top substrate, and bottom substrate, and inner substrate are silicon dioxide and gold alloy which are deposited on the top substrate, and bottom substrate, and inner substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with the top substrate, and bottom substrate, and inner substrate are silicon dioxide and gold alloy which are deposited on the top substrate, and bottom substrate, and inner substrate, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Regarding claim 39;** Autrey et al discloses all of features of claimed invention except for the substrate are silicon coated with one of titanium-gold or tin-gold alloy and further including the step of using temperature and pressure to form a gold-silicon or

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gold-tin eutectic bond between the substrates. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with the substrate are silicon coated with one of titanium-gold or tin-gold alloy and further including the step of using temperature and pressure to form a gold-silicon or gold-tin eutectic bond between the substrates, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Autrey et al in view of Oberhardt as applied to claim 27 above, and further in view of Ueno et al (U.S. Patent No. 6,600,558).**

**Regarding claim 29;** Autrey et al in view of Oberhardt discloses all of features of claimed invention except for gas inlet and outlet ports through one or both of the outer layers and into the buffer cavities. However, Ueno et al teaches that it is known in the art to provide optical cell (7 of figure 3) having gas inlet and outlet ports (figure 3) through one or both of the outer layers and into the buffer cavities (figures 3-4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with gas inlet and outlet ports through one or both of the outer layers and into the buffer cavities as taught by Ueno et al for the purpose of determining accurately of quantitative concentration gas.



**Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Autrey et al in view of Oberhardt as applied to claim 27 above, and further in view of Drzewiecki (U.S. Patent No. 6,286,360).**

**Regarding claim 30;** Autrey et al in view of Oberhardt disclose all of features of claimed invention except for the thin film microphone is a piezoelectric microphone. However, Drzewiecki teaches that it is known in the art to provide the thin film microphone is a piezoelectric microphone (col.4 lines 54-63). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with a the thin film microphone is a piezoelectric microphone as taught by Drzewiecki for the purpose of low cost pressure drop flow element, the pressure drop across which is related to the flow rate, density and viscosity of the gas mixture.

**Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Autrey et al (U.S. Patent No. 6,348,968) in view of Moecki et al (U.S. Patent No. 7,034,943).**

**Regarding claim 23;** Autrey et al discloses an integrated photoacoustic spectroscopy cell, comprising:

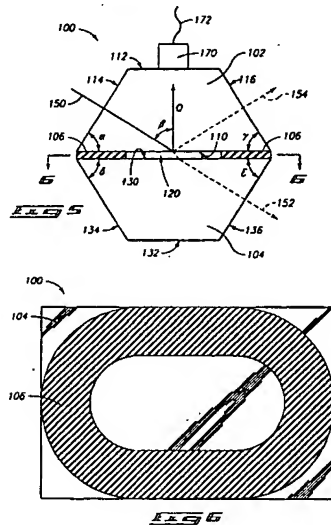
photoacoustic spectroscopy cell (100 of figure 5) having a multi-layer structure (102, 106, 104 of figure 5) for receiving a gas sample (col.6 lines 21-26) for the spectroscopy cell (100 of figure 5) and having an inner layer (106 of figure 5 is shim material) disposed between top and bottom outer layers (i.e., first block material [102 of figure 5] and second block material [104 of figure 5]), with the inner layer (106 of figure

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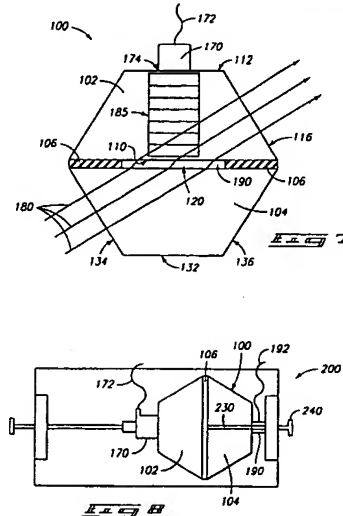
5) being patterned to form a resonance cavity (center sample reservoir [120 of figure 5]); and

a thin-film membrane microphone (i.e., a transducer is preferably an acoustic microphone [col.2 line 50 to col.3 line 12 and col.8 line 66 to col.9 line 5]) formed on one of the outer layers (102 of figure 7) and acoustically coupled to the resonant cavity (120 of figure 7). See figures 1-13.

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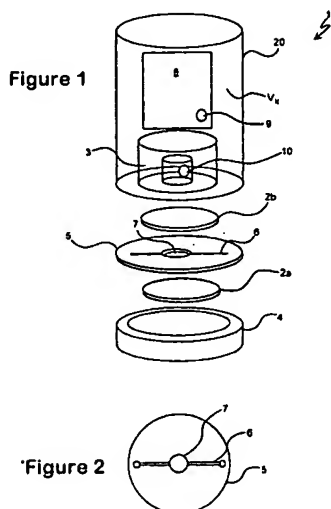


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Autrey et al discloses all of features of claimed invention except for the inner layer being patterned to include an open tube resonant cavity with buffer cavities from on either side thereof. However, Moeckli et al teaches that it is known in the art to provide photoacoustic detector (1 of figure 1) having the inner layer (5 of figure 1) being patterned (figure 1) to include an open tube resonant cavity (6 of figures 1-2) with buffer cavities (figure 2) from on either side thereof. See figures 1-9.

U.S. Patent Apr. 25, 2006 Sheet 1 of 8 US 7,034,943 B1



It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with the inner layer being patterned to include an open tube resonant cavity with buffer cavities from on either side thereof as taught by Moeckli et al for the purpose of reducing signal-to-noise ratios in photoacoustic detectors and other gas sensors to maintain an adequate response time to changing gas concentration levels.

**Regarding claim 25;** Autrey et al discloses all of features of claimed invention except for the layers are silicon wafers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with the layers are made of silicon wafers, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Autrey et al in view of Moeckli et al as applied to claim 23 above, and further in view of Ueno et al (U.S. Patent No. 6,600,558).**

Regarding claim 29; Autrey et al in view of Moeckli et al discloses all of features of claimed invention except for gas inlet and outlet ports through one or both of the outer layers and into the buffer cavities. However, Ueno et al teaches that it is known in the art to provide optical cell (7 of figure 3) having gas inlet and outlet ports (figure 3) through one or both of the outer layers and into the buffer cavities (figures 3-4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine device of Autrey et al with gas inlet and outlet ports through one or both of the outer layers and into the buffer cavities as taught by Ueno et al for the purpose of determining accurately of quantitative concentration gas.

***Allowable Subject Matter***

Claims 40-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record, taken alone or in combination, fails discloses or render obvious a method of fabricating a photoacoustic spectroscopy cell comprising all the specific elements with the specific combination including of step of the substrates are silicon and wherein the step of acoustically coupling a microphone to the resonant cavity includes the steps of: depositing a piezoelectric thin film onto one of the top and bottom substrates; etching and patterning the thin film to create an acoustic sensor; and

forming a port extending from the acoustic sensor into the resonant cavity in set forth limitation of claim 40.

### ***Response to Arguments***

Applicant's arguments with respect to claims 23-42 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed 12/29/06 have been fully considered but they are not persuasive. Applicant's argued, pages 7-8, that Autrey et al and Oberhardt, and Drzewiecki, Ueno, and Olsen references does not teach or suggest "an open tube resonant cavity with buffer cavities on either side of the resonant cavity.

This argument is not persuasive.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

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references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Applicant's argued that Autrey et al and Oberhardt, and Drzewiecki, Ueno, and Olsen references does not teach or suggest "an open tube resonant cavity with buffer cavities on either side of the resonant cavity. As stated in above Office action, Autrey et al discloses all of features of claimed invention except for the inner layer being patterned to include an open tube resonant cavity with buffer cavities from on either side thereof. However, Moeckli et al teaches that it is known in the art to provide photoacoustic detector (1 of figure 1) having the inner layer (5 of figure 1) being patterned (figure 1) to include an open tube resonant cavity (6 of figures 1-2) with buffer cavities (figure 2) from on either side thereof. See figures 1-2. Thus, the references are considered in combination, the recitation of the claims would have been obvious suggested.

For the reasons set forth above the arguments, it is believed that the rejection of the claims 23-42 under 35 U.S.C 103 (a) is proper.

### **Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

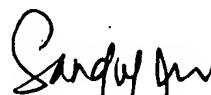
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Nguyen whose telephone number is (571) 272-2425. The examiner can normally be reached on 9:30 am to 7:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifu Chowdhury can be reached on (571) 272-2800 ext. 86. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

March 16, 2007



Sang H. Nguyen  
Primary Patent Examiner  
Art Unit 2886